REMARKS

Claims 1-47 are pending. As a preliminary matter, Applicants wish to thank the Examiner for the notice that Claims 11-47 are allowed and Claims 2-10 would be allowed if rewritten in independent form. Claim 1 stands rejected under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent No. 6,462,738 to Kato (Kato). A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single reference.[1] Additionally, the single reference must set forth each of the claim elements as arranged by the claims.[2]

Kato

Kato teaches generating a control mesh of polygonal approximations. (Kato, Abstract, line 1, ¶1, 49-51). According to the Office Action, the control point b_{111} as taught in Kato corresponds to the claimed central control point. (Office Action dated December 17, 2003, ¶2, last sentence). Kato teaches that point b_{111} is given by equation 914. (Kato, FIG. 9, ¶8, lines 1-5). The point b_{111} as given by equation 914 represents the distance the Bezier patch will project from the plane containing the end points of the patch based on tangent vectors, not control points. (Kato, ¶8, lines 1-5). Equation 914 as shown in FIG. 9 is given as $b_{111} = 1/3\ (v_0 + v_1 + v_2) + 1/3\ (t_{00} + t_{11} + t_{22}) - 1/3\ (t_{10} + t_{21} + t_{02})$. However, the point labeled b_{111} is shown in Kato at FIG. 9 as a function of vertices v_0, v_1, v_2, and tangent vectors t_{00}, t_{11}, t_{22}, t_{10}, t_{21}, and t_{02} rather than "using the vertex parameters for each of the three vertices and the control points corresponding to the three edges." (Kato, FIG. 9, equation 914). As shown in more detail in

1 Glaverzel Societe Anonyme v. Northlake Marketing & Supply, Inc., 75 F.3d 1550, 1554 (Fed. Cir. 1999); Verdegaal Bros. v. Union Oil Co. of California, 814 F.2d 628, 631, 2 U.S.P.Q.2d 1051, 1953 (Fed. Cir. 1987); *see* MPEP 2131.

2 Richardson v. Suzuki Motor Co., 868 F.2d 1226, 1236, 9 U.S.P.Q.2d 1913, 1920 (Fed. Cir. 1989); *see* MPEP 2131.

FIG. 10, the tangent vectors 1003, 1004 for each edge 901, 902, 903 of the received polygon are generated based on the surface normals 1001, 1002. (Kato, ¶7, lines 51-54). A first tangent vector 1003 is generated responsive to equation 1005 and a second tangent vector 1004 is generated responsive to equation 1006, where t_0 is the first tangent vector 1003, t_1 and is the second tangent vector. (Kato, ¶7, lines 54-57). Therefore, equation 914 explicitly describes point b_{111} as a function of tangent vectors and not as a function of two control points corresponding to each edge and, therefore, point b_{111} is not a central control point as defined in the claims.

Independent Claim 1

Kato teaches that the point labeled b_{111} as shown in FIG. 9 and as referenced by reference number 914 is a function of the vertices and six tangent vectors rather than "calculating a central control point using the vertex parameters of each of the three vertices and the control points corresponding to the three edges." Further, equation 914 merely teaches the calculation of control point b_{111} based on tangent vectors and makes no reference to any control points, let alone the control points in equations 906 through 913. To the extent that Applicant calculates a central control point "using the vertex parameters for each of the three vertices and the control points corresponding to the three edges," Applicants' claimed subject matter is wholly different from that described in Kato, where Kato describes the calculation of control point b_{111} in equation 914 as a function of tangent vectors rather than any control points.

Rather than teaching that the control points are the six tangent vectors in equation 914, the Office Action states "as can be seen in Kato, FIG. 9, the two control points corresponding to each edge are based on the vertex parameters of the vertices that define the edge." (Office Action dated December 17, 2003, ¶6, last three sentences of page 7 ending on page 8). "For example, the edge 901 is defined by vertices b_0 and b_1." Id. "The two control points (b210 and

b120 on that edge 901) are calculated based on the vertex parameters that define edge 901, i.e., vertices v_0 and v_1." Id. However, contrary to this assertion, Kato explicitly shows that the point b_{111} shown as equation 914 is not a function of "control points corresponding to the three edges", but rather a function of vertices and tangent vectors.

The Office Action on page 8 asserts that "with respect to the central control point (b_{111}), it can be seen that equation 914 includes the parameters for each of the three vertices (v_0, v_1 and v_3), and the control points corresponding to the three edges (t_{00}, t_{11}, t_{22}, t_{10}, t_{21} and t_{02})." (Office Action dated December 17, 2003, ¶6, page 8, lines 3-6). However, contrary to the assertion in the Office Action, equation 914 is not a function of control points corresponding to the three edges but rather a function of the tangent vectors as previously stated and therefore the resulting calculations are completely different. Applicants would like to point out the distinction between the resulting calculations. The Office Action incorrectly equates "the control points correspond to the three edges" with tangent vectors t_{00}, t_{11}, t_{22}, t_{10}, t_{21}, and t_{02}; however, these tangent vectors are not control points as asserted in the Office Action. Applicants would like to point out the fundamental difference between a point and a vector. Additionally, Kato explicitly describes parameters t_{00}, t_{11}, t_{22}, t_{10}, t_{21}, and t_{02} as tangent vectors rather than control points and as such are completely different parameters resulting in completely different calculations. Accordingly, equation 914 cited in FIG. 9 of Kato which recites the calculation of control point b_{111} as a function of vertices and tangent vectors is limited to the calculation of point b_{111} as a function of tangent vectors rather than teaching "calculating a central control point using the vertex parameters for each of the three vertices and the control points corresponding to the three edges." As such, Applicants submit that Kato neither discloses, teaches or suggests Applicants' claimed subject matter.

As previously stated above, in contrast to calculating a central control point using the control points corresponding to the three edges, Kato describes the calculation of point b_{111} based on tangent vectors and as a result, is more computationally expensive and requires a corresponding amount of memory to store the intermediate results for the calculation of the tangent vectors as shown in FIG. 10. Kato, therefore, is referring to a completely different parameter when referring to the tangent vectors than "calculating a central control point using the vertex parameters for each of the three vertices and the control points corresponding to the three edges." As such, where Claim 1 requires that the central control point is calculated based on the control points corresponding to the three edges, Kato appears to make no reference to the calculation of point b_{111} based on any points relating to the three edges. Accordingly, the cited portions of Kato simply teach the calculation of control point b_{111} based on vertices and tangent vectors. As a result, Kato is referring to a completely different method with respect to the claimed elements, namely *inter alia* "calculating a central control point using the vertex parameters for each of the three vertices and the control points corresponding to the three edges."

Applicants submit that the calculation of point b_{111} as shown as equation 914 of FIG. 9 lacks the advantages present in Applicants' claimed subject matter. As previously stated, Applicants' calculation of a central control point is a relatively simple mathematical function of vertex parameters for each of the three vertices and the control points corresponding to the three edges. Unlike Applicants' subject matter, a computationally intensive calculation of the six tangent vectors as taught by Kato in FIGs. 9 and 10 for tangent vectors 1005 and 1006 is necessary in Kato. Tangent vectors 1005 and 1006 are shown to be calculated based on the vector calculation of normal vectors and an edge. Since vector calculations and cross product calculations are required by Kato, the method described in the Applicants' claimed invention is

wholly different than Kato's method as cited since claim 1 does not require vector calculations or cross products of vectors and as a result, is much more computationally efficient than the method taught by Kato. Consequently, the central control point computations performed by the method as shown in Claim 1 allow for a significant reduction in computational expense over the method taught by Kato in the computation of point b_{111} as shown in equation 914.

The resulting computation as shown in equation 914 and the calculation of tangent vectors 1005 and 1006 as shown in FIG. 10 results in a number of other disadvantages. For example, according to the equations shown in FIG. 9, Kato requires the calculation of control point b_{111} as shown in equation 914 based on tangent vectors and as a result requires storage of the results of each computation for the tangent vectors as shown in equations 906 through 914. Consequently, Kato is computationally more expensive and further requires additional memory to store the result of the computations shown by equations 906 through 914.

Since Kato teaches a different method than as shown in Claim 1 and is more computationally expensive and also more expensive in terms of memory storage requirements, the method taught by Kato is unsatisfactory to anticipate Claim 1 and further teaches away from Claim 1. Applicants submit that the computation requirements of equations 906 through 914 as shown in Kato in FIG. 9 lack these and other advantages present in Applicants' claimed method. Consequently, as the Office Action has similarly ignored a principle limitation of Claim 1 and since Kato does not disclose "calculating a central control point using the vertex parameters for each of the three vertices and the control points corresponding to the three edges" as defined in Claim 1, Applicants submit that Kato does not anticipate the invention as defined Claim 1. Accordingly, reconsideration of the rejection of Claim 1 is respectfully requested.

Further, Kato teaches the surface normal information previously stored as part of the reconstruction data is retrieved 708 and used to generate two surface tangents for each surface normal. (Kato, ¶7, lines 48-51). Accordingly, since Kato teaches the generation of surface tangents because a surface normal information was previously stored as part of the reconstruction data, Kato further teaches away from the claims because the calculation of any control points on the edges would result in the computation of extraneous results. For example, Kato teaches directly calculating control point b_{111} based on the tangent vectors without having to calculate the control points in equations 906 through 913 as an intermediate step. As such, the cited portions of Kato teach away from the claims. Accordingly, taken into proper context, Kato teaches the avoidance of the calculation of the control points because the calculation of the control points would result in extraneous and computationally expensive processing, and because of the necessary storage requirements for saving the results of each tangent vector computation as previously stated. For example, Kato describes the single iteration methodology to be implemented in dedicated hardware such that the recursive processing of conventional systems is eliminated. (Kato, ¶7, lines 2-5). Therefore, taking the teachings of Kato into proper context show that Kato is limited to a method for calculating point b_{111} using equation 914 based on vertex parameters and normal vectors and any modification to equation 914 would change the principle of operation to Kato.[3] Accordingly, not only does Kato teach away from the

[3] If the proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims *prima facie* obvious. *In re Ratti*, 270 F.2d 810, 123 U.S.P.Q. 349 (CCPA 1959). *See* M.P.E.P. 2143.01.

calculation of a central control point based on the control points corresponding to the three edges, any modification to Kato to avoid the calculation of point b_{111} based on tangent vectors would change the principle of operation of Kato because modifying Kato otherwise would greatly increase the computations required and would result in the unnecessary and extraneous calculation of control points for which Kato specifically has sought to avoid.[4] For example, Kato has calculated all the Bezier control points as a function of vertex parameters and tangent vectors. If Kato fails to suggest the computation of point b_{111} based on control points corresponding to the three edges, it is because Kato never contemplates the calculation of b_{111} based on control points corresponding to the three edges in view of Kato's explicit teachings, namely, the computation of these Bezier control points based on vertices and tangent vectors.

Applicants respectfully submit that the claims are in condition for allowance, and an early Notice of Allowance is earnestly solicited. The Examiner is invited to telephone the below-listed attorney at 312-609-7970 if the Examiner believes that a telephone conference will expedite the prosecution of the application.

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[4] If the proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims *prima facie* obvious. *In re Ratti*, 270 F.2d 810, 123 U.S.P.Q. 349 (CCPA 1959). *See* M.P.E.P. 2143.01.